

Quiz #4: Kinematics in Two Dimensions and Force and Motion

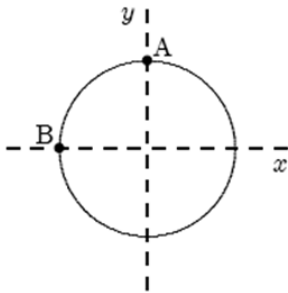
Problem 1 (1.5 points)

A baseball is hit at an angle θ and travels along a parabolic arc before it strikes the ground. Which one of the following statements is true?

- a) The acceleration of the ball decreases as the ball moves upward.
- b) The velocity of the ball is 0 when the ball is at the highest point in the arc.
- c) The acceleration of the ball is 0 when the ball is at the highest point in the arc.
- d) The velocity of the ball is a maximum when the ball is at the highest point in the arc.
- e) None of the above.

Problem 3 (1.5 points)

A toy racing car moves with constant speed around the circle shown below. When it is at point B, its coordinates are $x = -2$ m, $y = 0$ m and its velocity is $(-4 \text{ m/s})\mathbf{j}$. When it is at point A, its velocity and acceleration are:

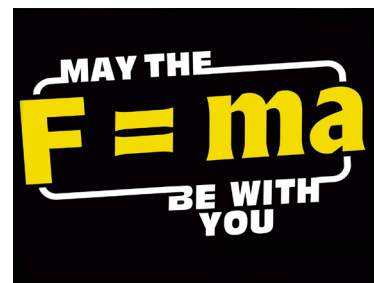


- a) $(4 \text{ m/s})\mathbf{i}$ and $(8 \text{ m/s}^2)\mathbf{j}$, respectively
- b) $(4 \text{ m/s})\mathbf{i}$ and $(-8 \text{ m/s}^2)\mathbf{j}$, respectively
- c) $(-4 \text{ m/s})\mathbf{i}$ and $(8 \text{ m/s}^2)\mathbf{j}$, respectively
- d) $(-4 \text{ m/s})\mathbf{i}$ and $(-8 \text{ m/s}^2)\mathbf{j}$, respectively
- e) $(-4 \text{ m/s})\mathbf{i}$ and 0, respectively

Problem 3 (3 points)

An object experiencing a constant force accelerates at 8.0 m/s^2 . What will the acceleration of the object be (in m/s^2) if:

- a) The force is the same and the mass is cut in half?
- b) The force is quadrupled and the mass is doubled?
- c) The force is cut in half and the mass is tripled?



Problem 4 (4 points)

A baseball is thrown with an initial speed of 23.5 m/s at a 42.0° angle in the absence of air resistance.

a) What is baseball's speed and direction of the travel at $t = 3.00$ s?

b) What is the ball's height when it has traveled a horizontal distance of 35.0 m?

c) What is the maximum height reached by the baseball?